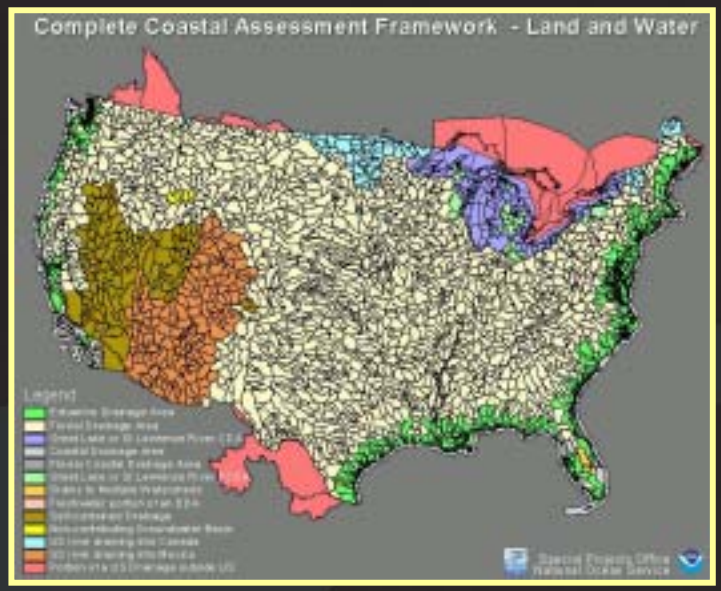
Inland Boundary Options for an Integrated Spatial Framework for Ecosystem-Based Management



Presentation to the
Regional Ecosystem Delineation Technical Workshop

August 31 and September 1, 2004
NOAA Coastal Services Center, Charleston, SC

Dan Farrow, Chief, Special Projects, Management and Budget Office, NOS, NOAA
Katherine Lins, Chief, Office of Water Information, Water Resources Division, USGS
Debra Hernandez, Director, Policy & Program Development
South Carolina Department of Health & Environmental Control

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Overview

- The National Water Boundary Dataset and other projects — Katherine Lins
- Inland Boundary Options — Dan Farrow
- Inland Boundaries from the State Perspective — Debra Hernandez
- Questions / Discussion

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The National Water Boundary Dataset and other projects

Katherine Lins, USGS

Inland Boundary Options

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Pieces of the Puzzle

1. NOAA/NOS Coastal Assessment Framework (CAF)
2. NOAA/NWS National Basin Delineation (NBD) project
3. EPA's Level III Ecoregions
4. FWS/NFS Ecosystem Regions
5. NOAA/NMFS inland extent of diadromous fish (historic and current)
6. Head of Tide, dams and first obstructions
7. Coastal Zone Management boundaries

Inland Boundary Options

- Option 1 – Entire Coastal Assessment Framework
- Option 2 – Coastal component of Coastal Assessment Framework – Estuarine and Coastal Drainage Areas
- Option 3 – Inland extent of anadromous fish
- Option 4 – Head of Tide, first obstruction preventing passage upstream
- Option 5 – Combo – Coastal component of Coastal Assessment Framework and watersheds containing inland extent of anadromous fish

An Integrated Spatial Framework for Ecosystem-Based Management

- A seamless, integrated spatial framework for both land and marine components
- Key physical, biological, and human activity data layers
- A fundamental decision support tool for goal teams and external stakeholders
- Many existing data sets and capabilities could be incorporated

Role of a Spatial Framework for Management

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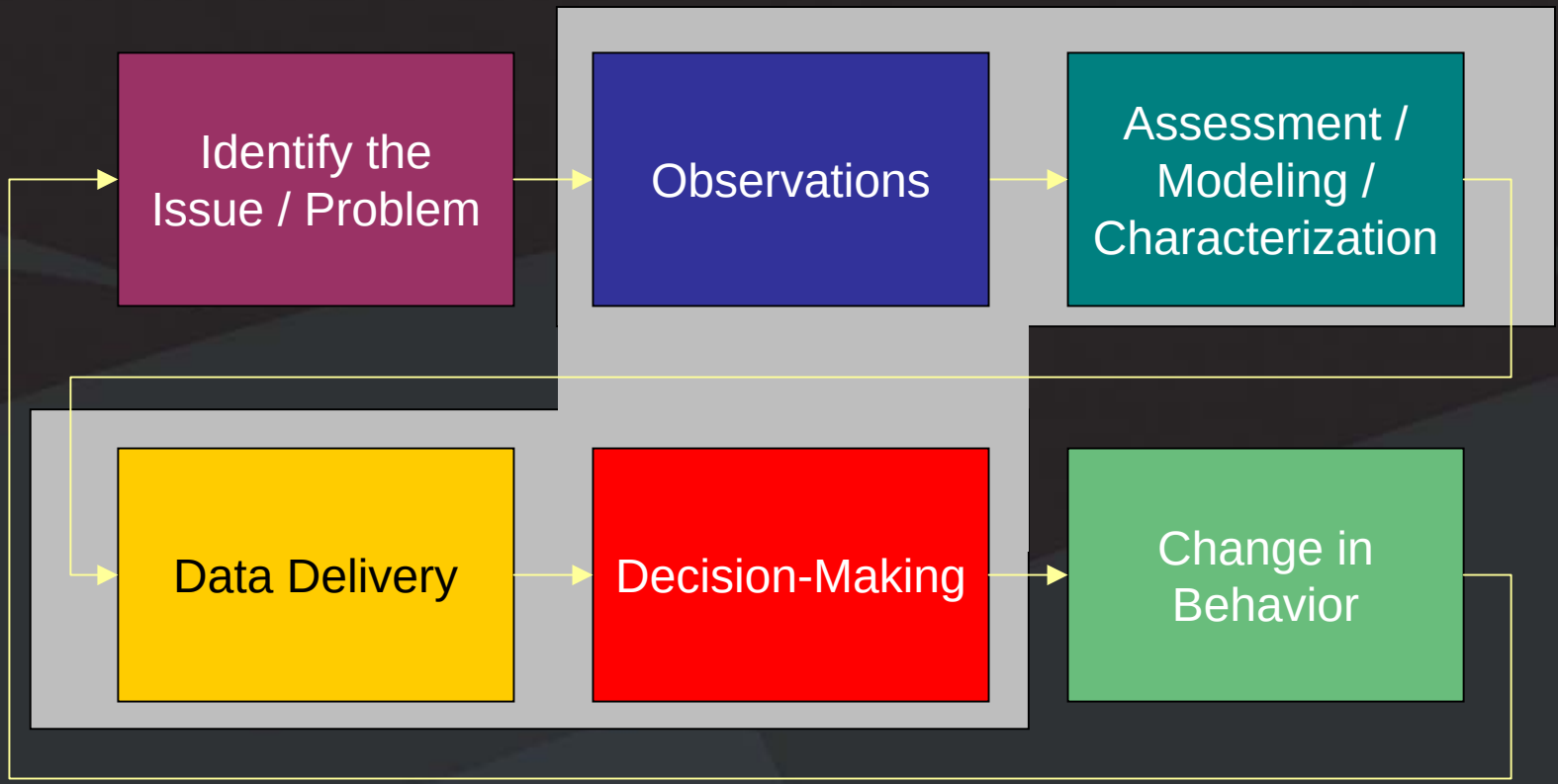

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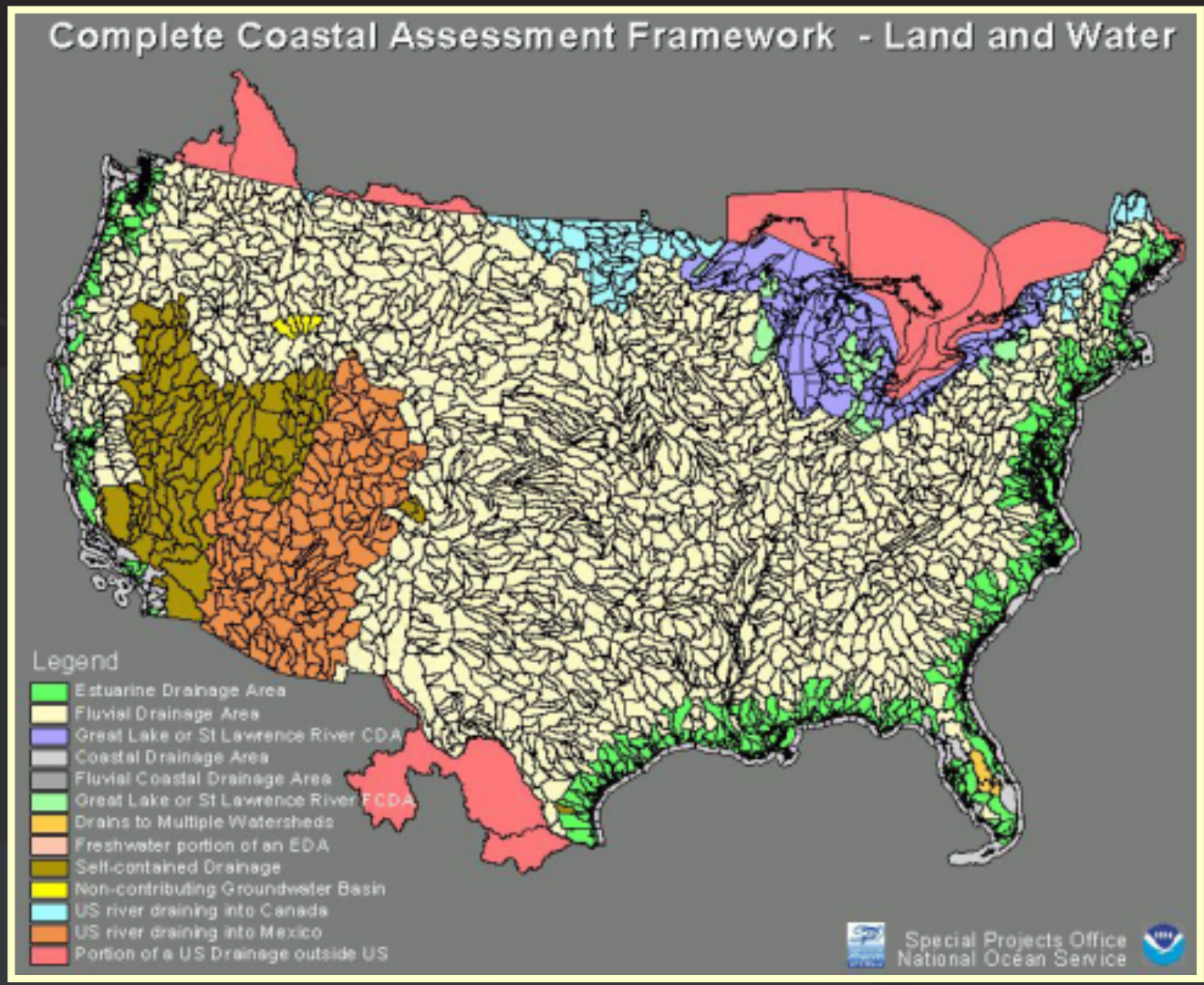
NOAA's Coastal Assessment Framework



Pieces of the Puzzle

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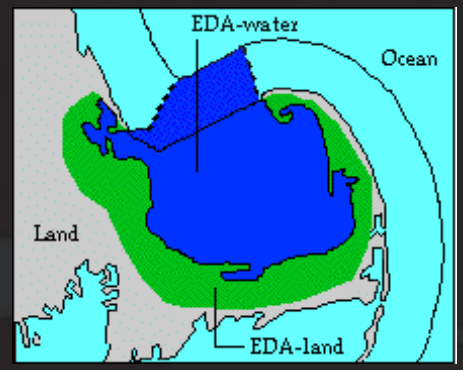
Six building blocks of the Coastal Assessment Framework

Estuarine Drainage Area (EDA) land component

Estaurine Drainage Area (EDA) water component



Coastal Drainage Area (CDA) land component

Coastal Drainage Area CDA) water component

Fluvial Drainage Area (FDA)

Coastal Fluvial Drainage Area (CFDA)

Pieces of the Puzzle

Inland Boundary Options

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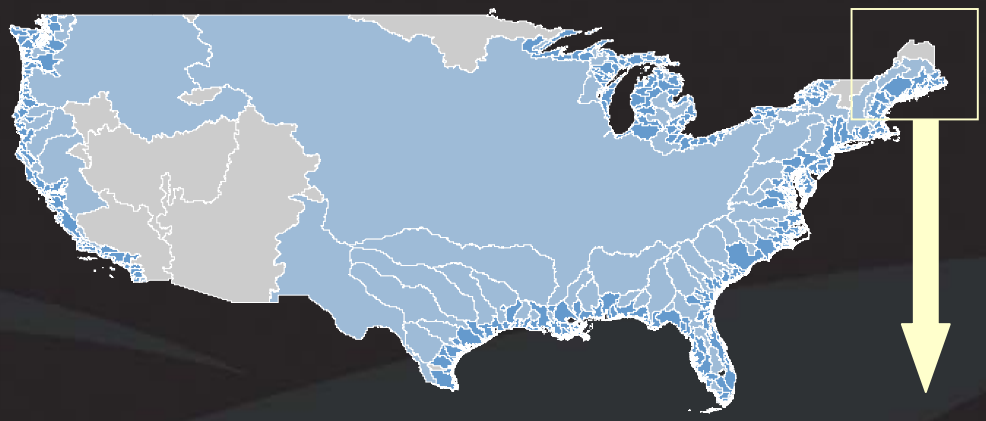
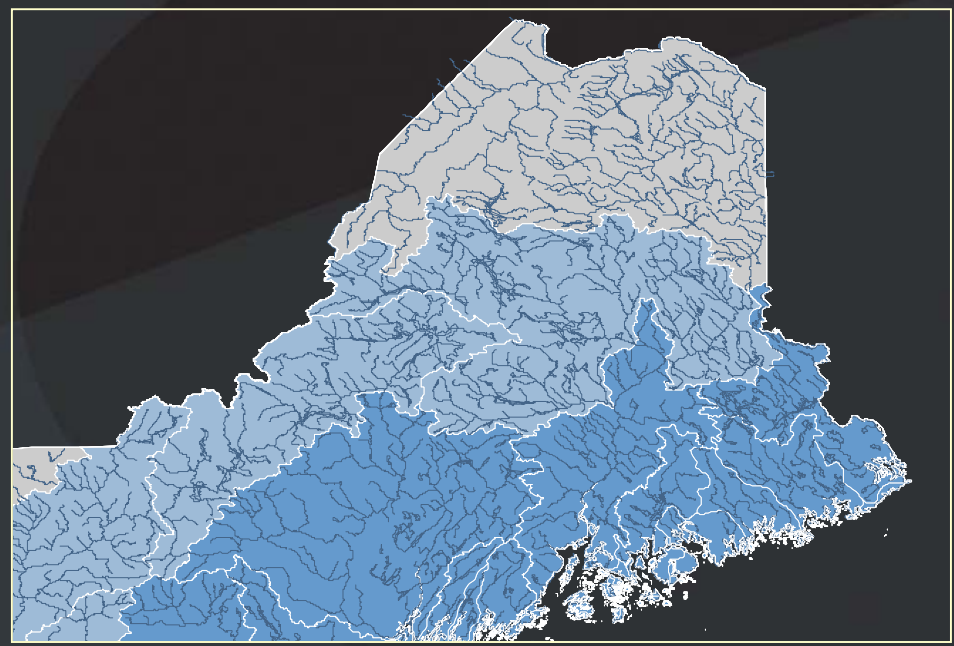
NOAA's Coastal Assessment Framework





Interior Drainage Area

Fluvial Drainage Area (FDA)

Estuarine Drainage Area (EDA)

Rivers

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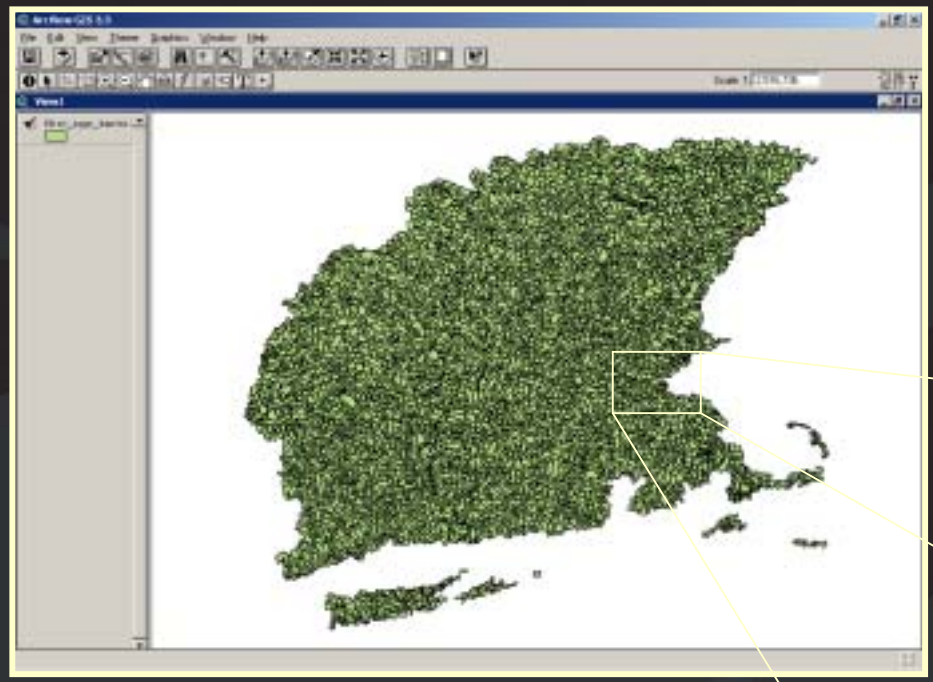
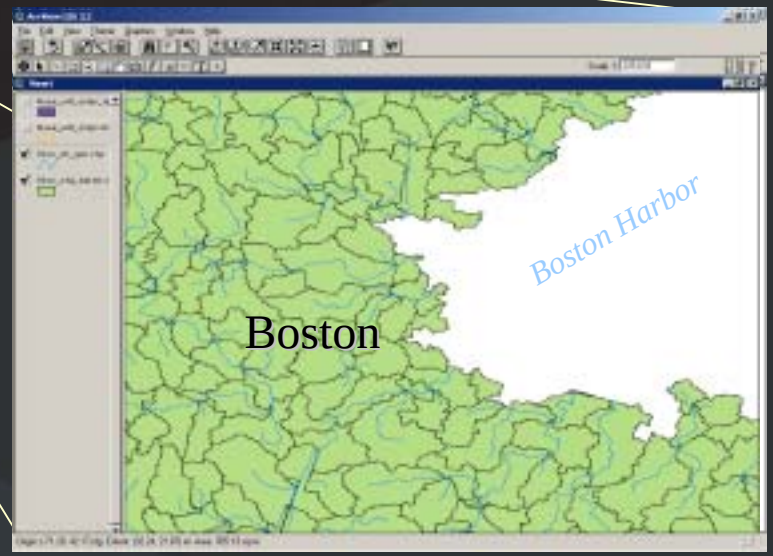
NOAA/National Weather Service's National Basin Delineation (NBD) Project



- Basins are delineated from 1-arc-second digital elevation data
- For use in Flash Flood Monitoring and Prediction Program to assist in flash flood warning decisions



- Basins aggregate to USGS cataloging unit
- Basins are defined in this system according to the natural topographic control of drainage and the topology river network.

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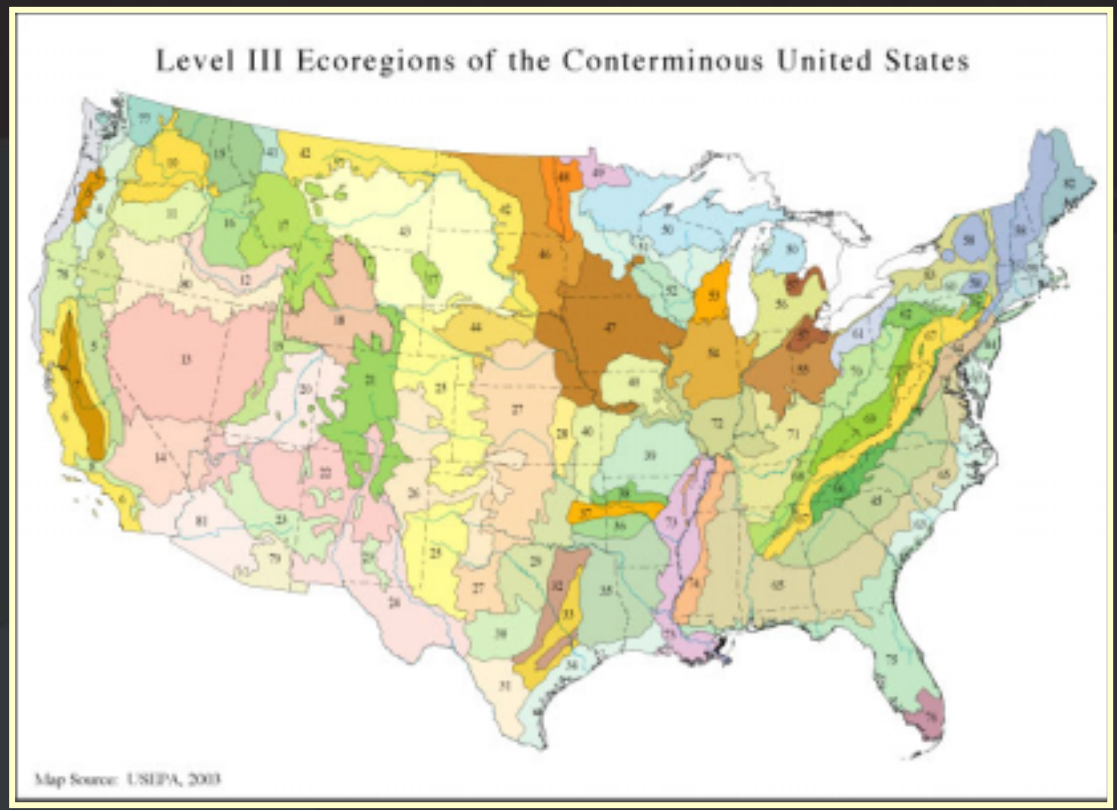
EPA's Level III Ecoregions

- Serve as a spatial framework for environmental resource management
- Most immediate needs:
  - develop a regional biological criteria and water quality standards
  - to set management goals for nonpoint source pollution
- Ecoregions denote areas within which ecosystems (type, quality, and quantity of env. resources) that are similar
- 84 Level III total ecoregions for the contiguous U.S.



Pieces of the Puzzle

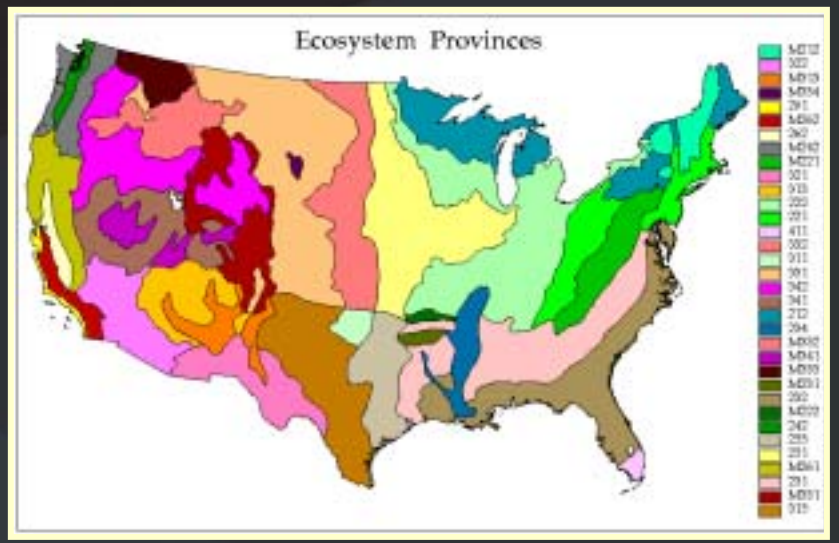
Inland Boundary Options

FWS Ecosystem Regions

- Based on USGS defined watersheds that are grouped.
- Determined based on the biological resources within a watershed; considers the economic health of communities within that watershed
- 53 units total

Forest Service Ecosystem Regions

- Adopted for use in ecosystem management
- They are areas of similar climate where ecosystems recur in predictable patterns
- Will be used in the proposed National Interagency Ecoregion-Based Ecological Assessments.



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Pieces of the Puzzle

Inland Boundary Options

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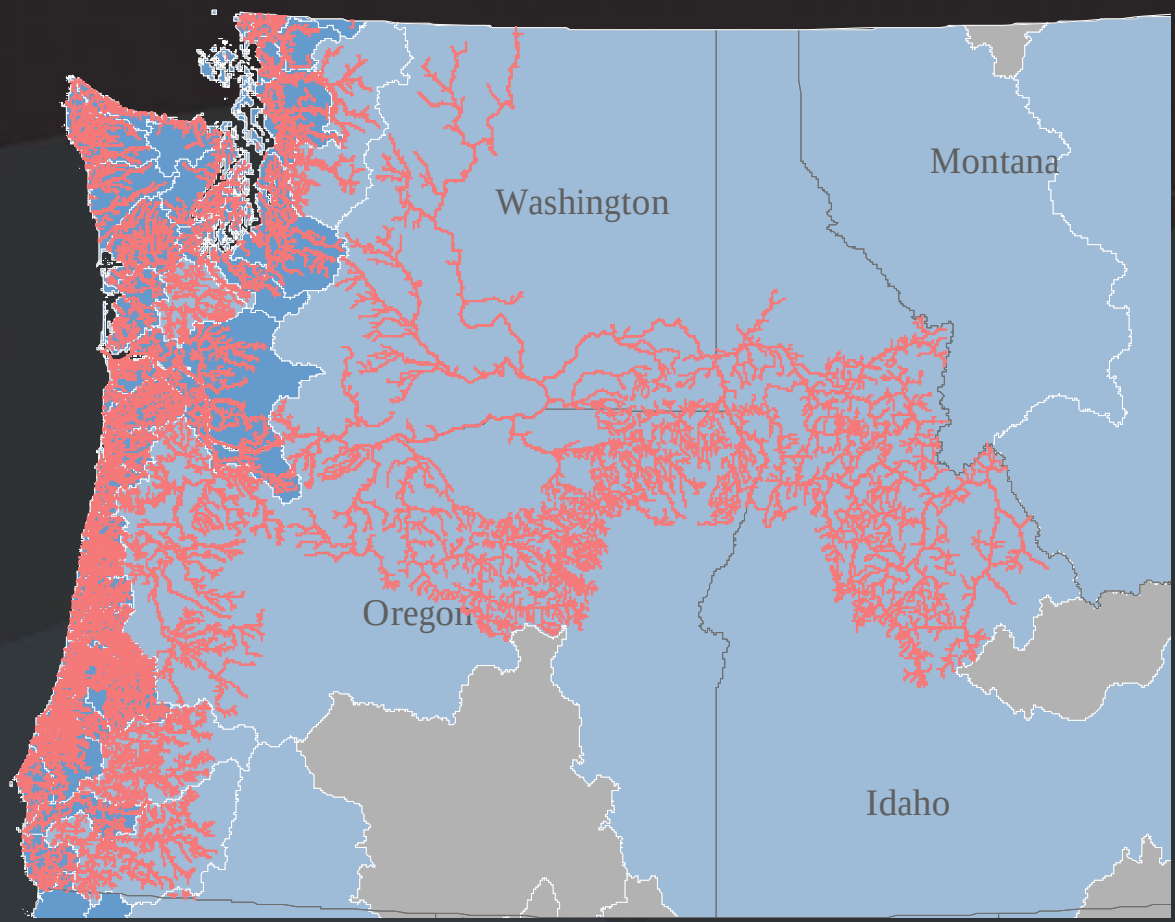
NOAA/NMFS inland extent of diadromous fish (historic and current)

- The historic and current range of pacific salmon extends well beyond the Estuarine Drainage Areas



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Head of Tide and Dams

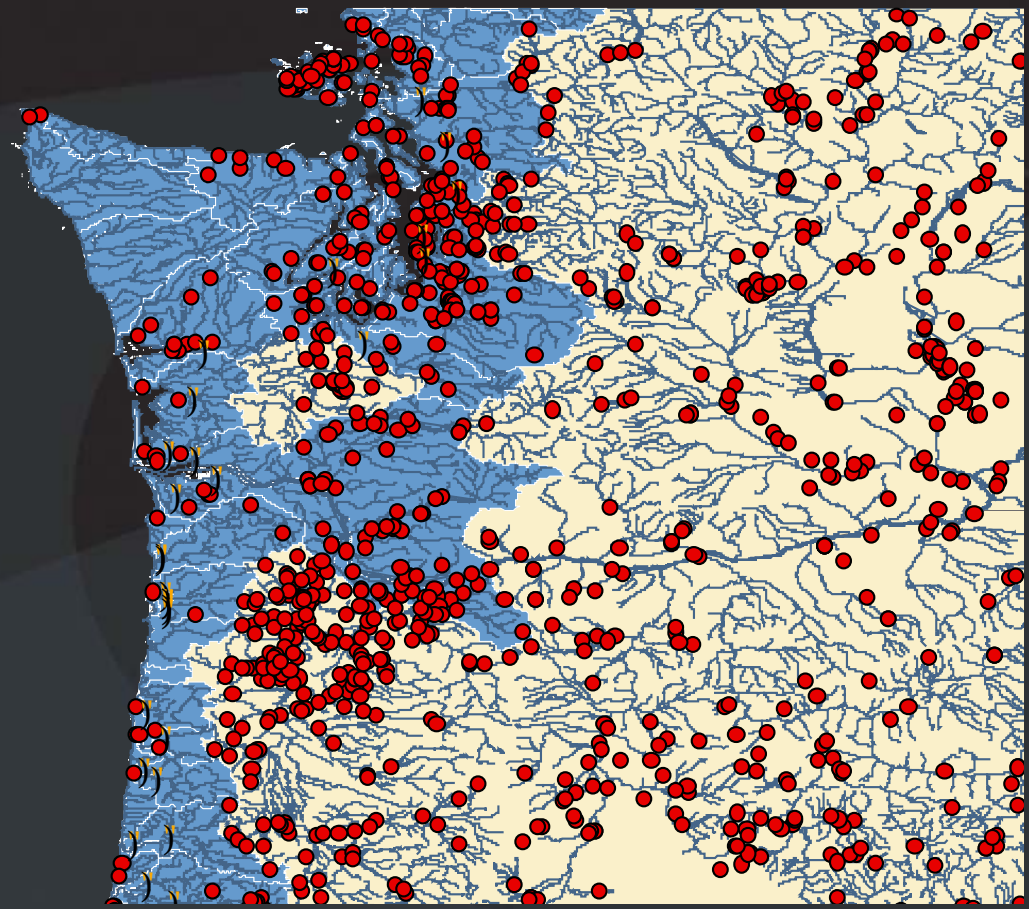
- The head of tide is the upper most extent of tidal influence, usually determined by the natural fall line or a man-made structure such as a dam
- Some terminal (1st tier) in-stream hydropower barriers exist beyond the Estuarine Drainage Areas (EDA).
- Diadromous fish ranges (salmon, shad, sturgeon) might extend up to these terminal barriers beyond the EDA's

EDA

Rivers

Dam

Head of Tide



Pieces of the Puzzle

Coastal Zone (CZ) Management Boundaries

Example

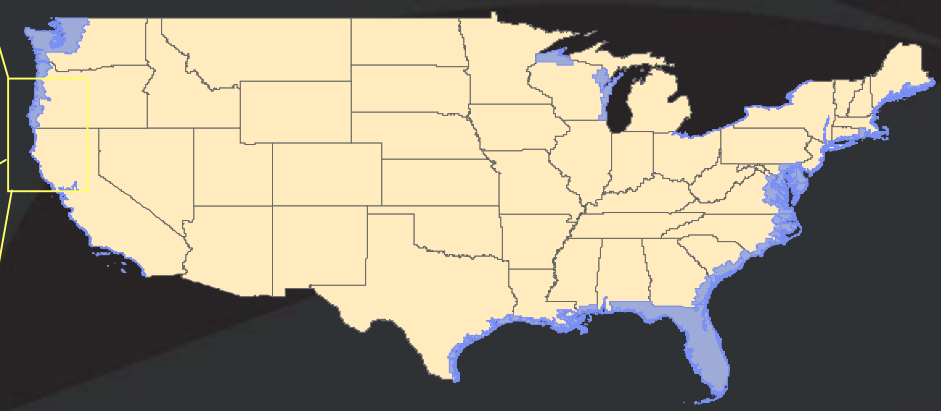
Oregon

CZ defined as the area west of the crest of the coastal mountain range

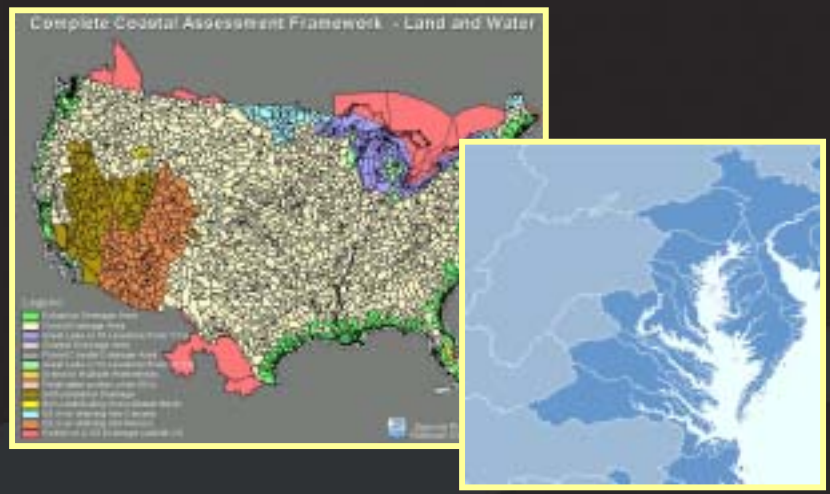
California

CZ extends inland 1,000 yards from the Mean High Tide with the exception of significant coastal estuarine, habitat and recreational areas…

- States define their coastal zone management boundary in a variety of ways – jurisdictional boundaries, watershed boundaries, distance from some datum, etc.



Option 1: Entire Coastal Assessment Framework



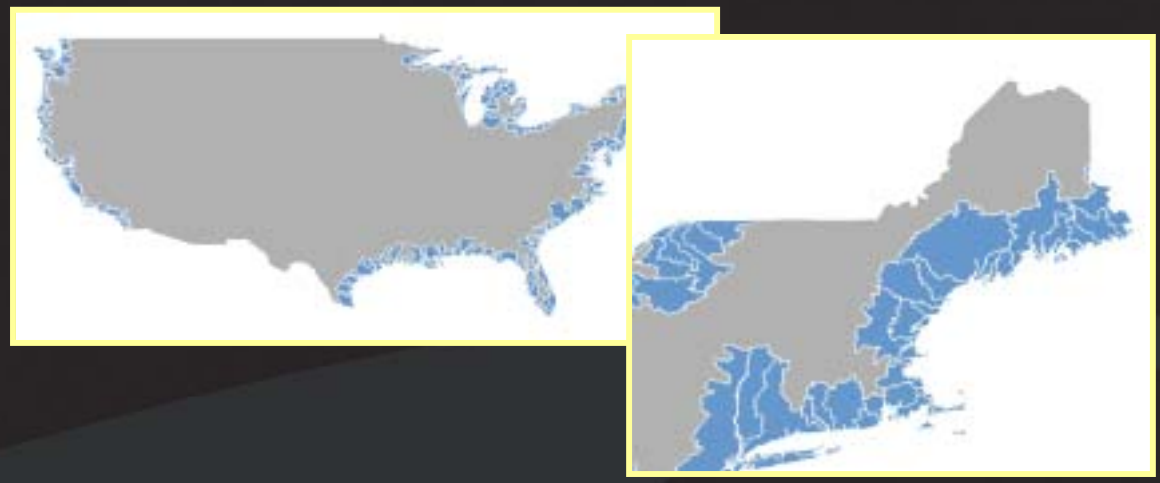
Advantages

- Framework already exists
- Comprehensive, allows characterization of entire watershed, both coastal and upstream portion
- Useful to a larger set of users – other Federal agencies, states, management councils, etc.

Disadvantages

- CAF needs to be updated and made more highly resolved (smaller basin size)
- Resource intensive to gather and synthesize management data

Option 2: Coastal component of Coastal Assessment Framework – Estuarine and Coastal Drainage Areas



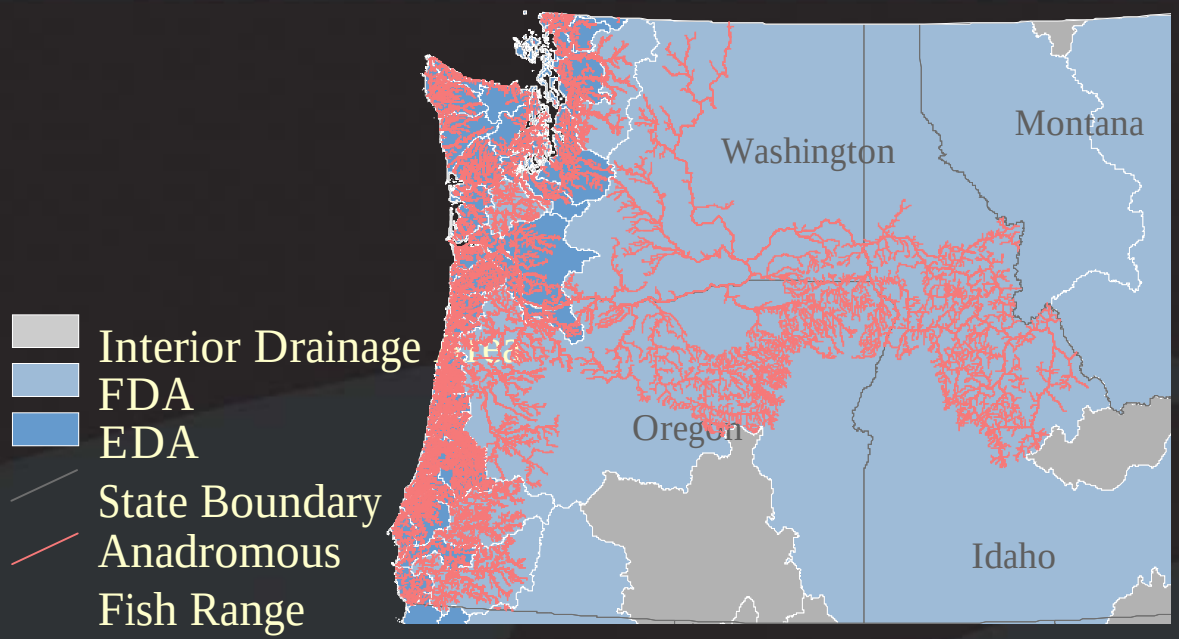
Advantages

- Framework already exists
- Focuses on the portion of the watershed most directly influencing estuarine waters
- Smaller area to characterize

Disadvantages

- CAF needs to be updated and made more highly resolved (smaller basin size)
- Useful to a smaller set of users, only partially characterizes the landside pressures

Option 3: Inland extent of diadromous fish



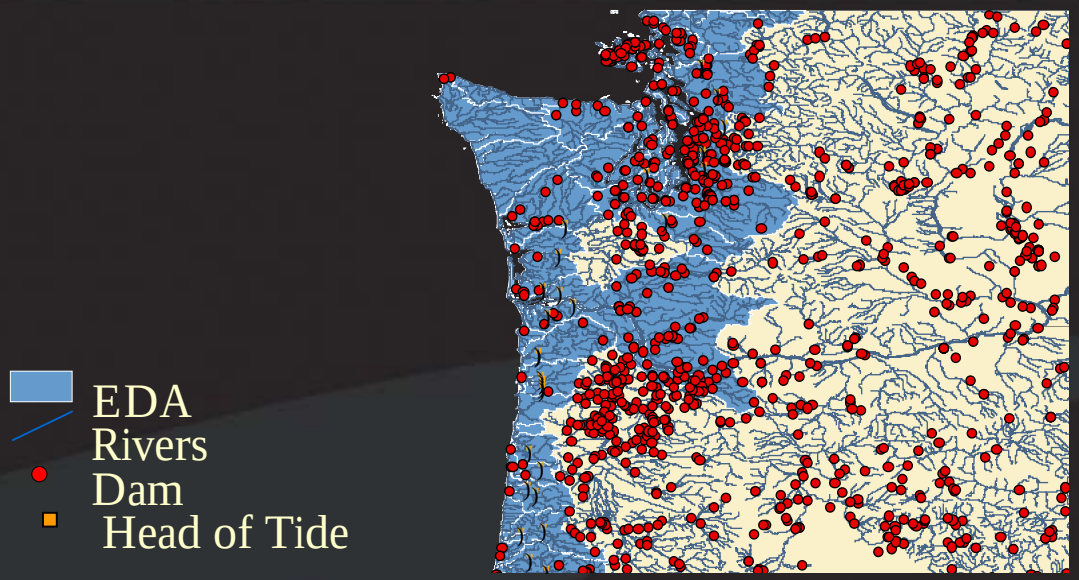
Advantages

- Focuses inland boundary specifically on this key fisheries management issue
- Targets characterization efforts

Disadvantages

- Not clear if inland extent is established for all species of interest.
- Useful to a significantly smaller set of users

Option 4: Head of tide, first obstruction preventing fish passage upstream



Advantages

- Areally more comprehensive area than Option 3
- Focuses inland boundary generally on a key fisheries management issue
- Targets characterization efforts

Disadvantages

- Head of tide, obstruction points not comprehensively defined
- Not watershed based - contributing drainage areas not defined
- First obstruction may change over time
- Useful to a significantly smaller set of users

Option 5: Combo – Coastal component of Coastal Assessment Framework and watersheds containing inland extent of diadromous fish

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Advantages

- Most information to build framework already exists
- Provides emphasis on those watersheds impacted by this key fisheries management issue while retaining a coastal focus for the rest of the country
- Targets characterization efforts compared to Option 1

Disadvantages

- CAF needs to be updated and made more highly resolved (smaller basin size)
- Useful to a smaller set of users, only partially characterizes the landside pressures

An Integrated Spatial Framework for Ecosystem-Based Management

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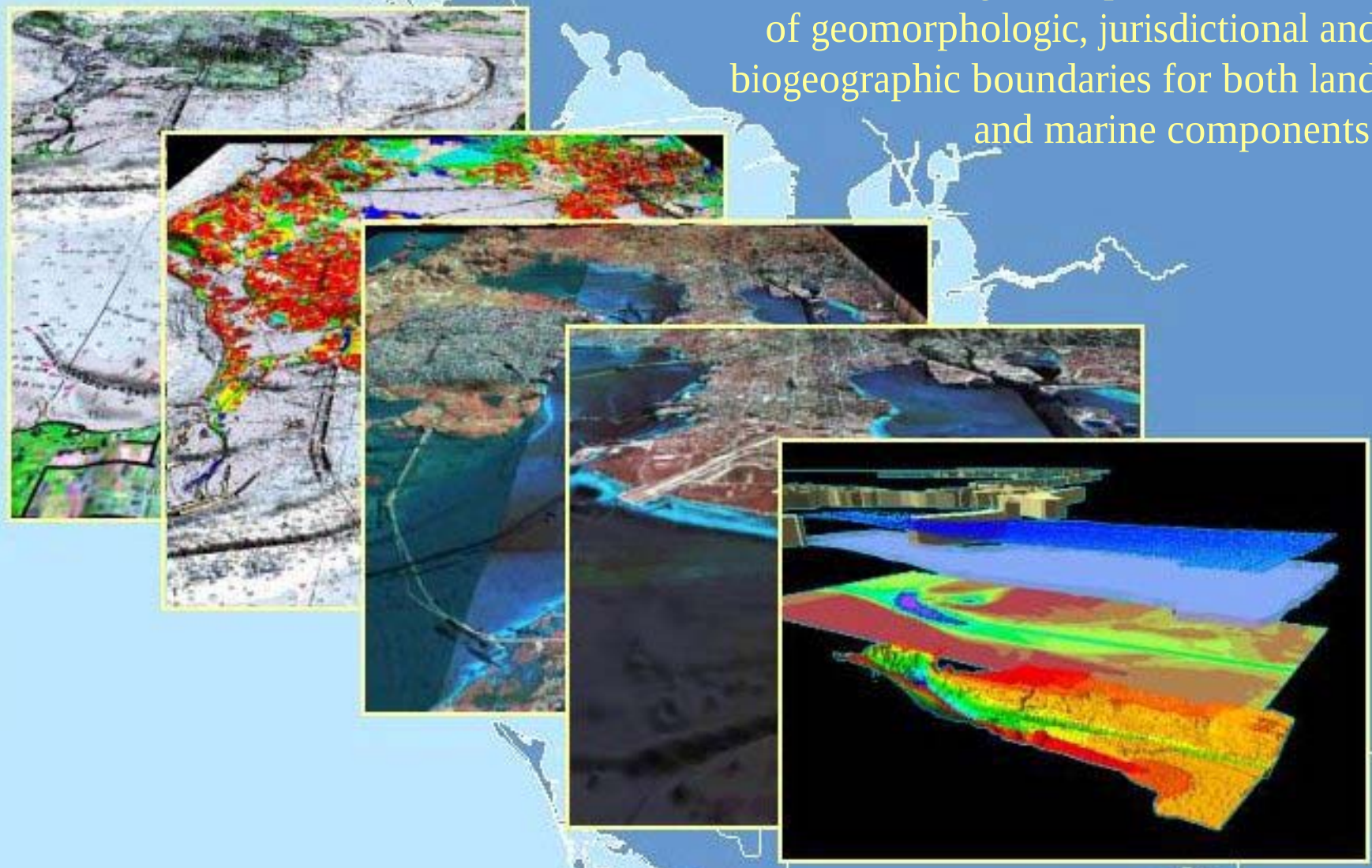
A seamless, integrated spatial framework of geomorphologic, jurisdictional and biogeographic boundaries for both land and marine components.



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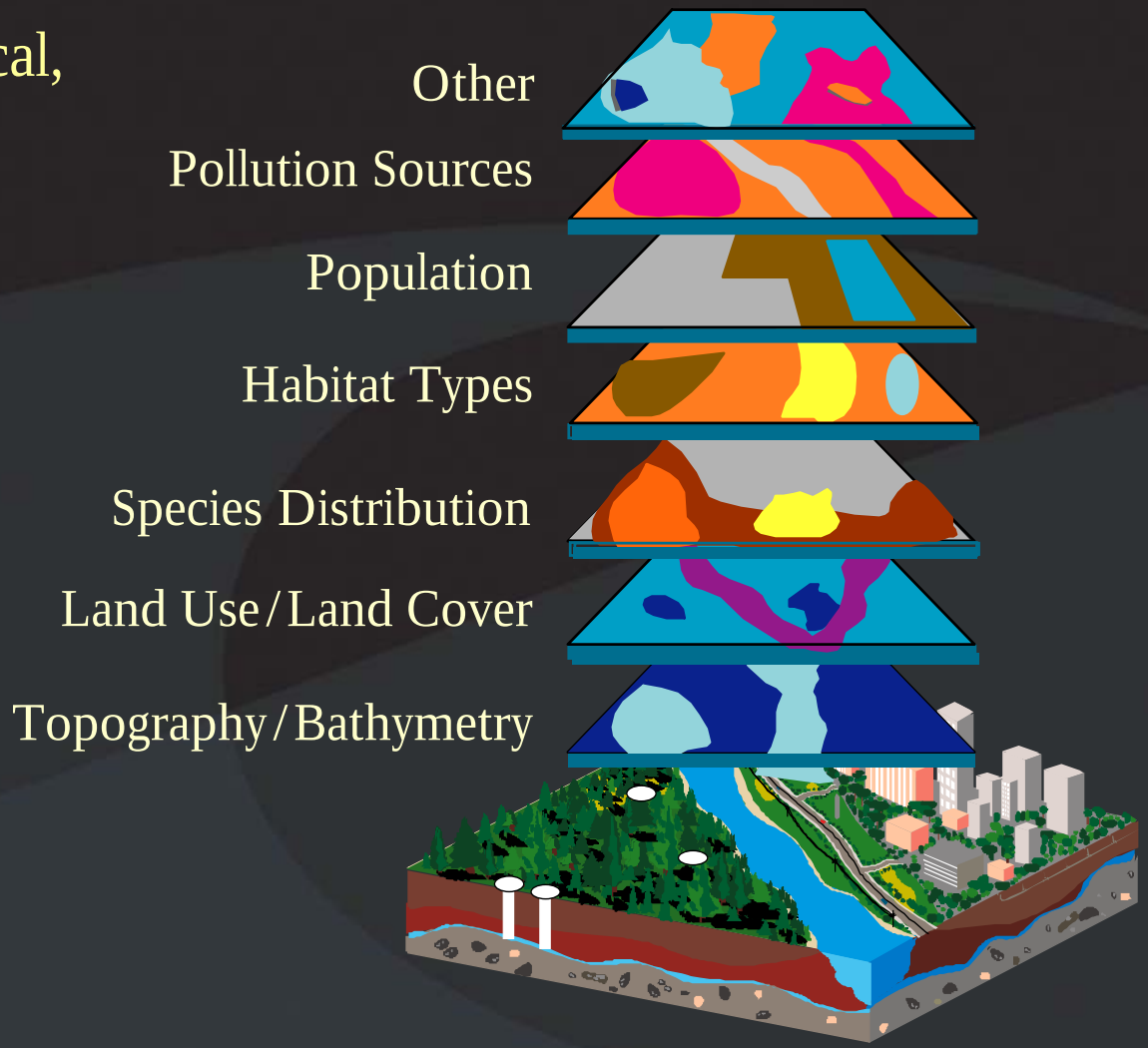
Supporting data layers - key physical, biological, and human activity parameters.



An Integrated Spatial Framework for Ecosystem-Based Management

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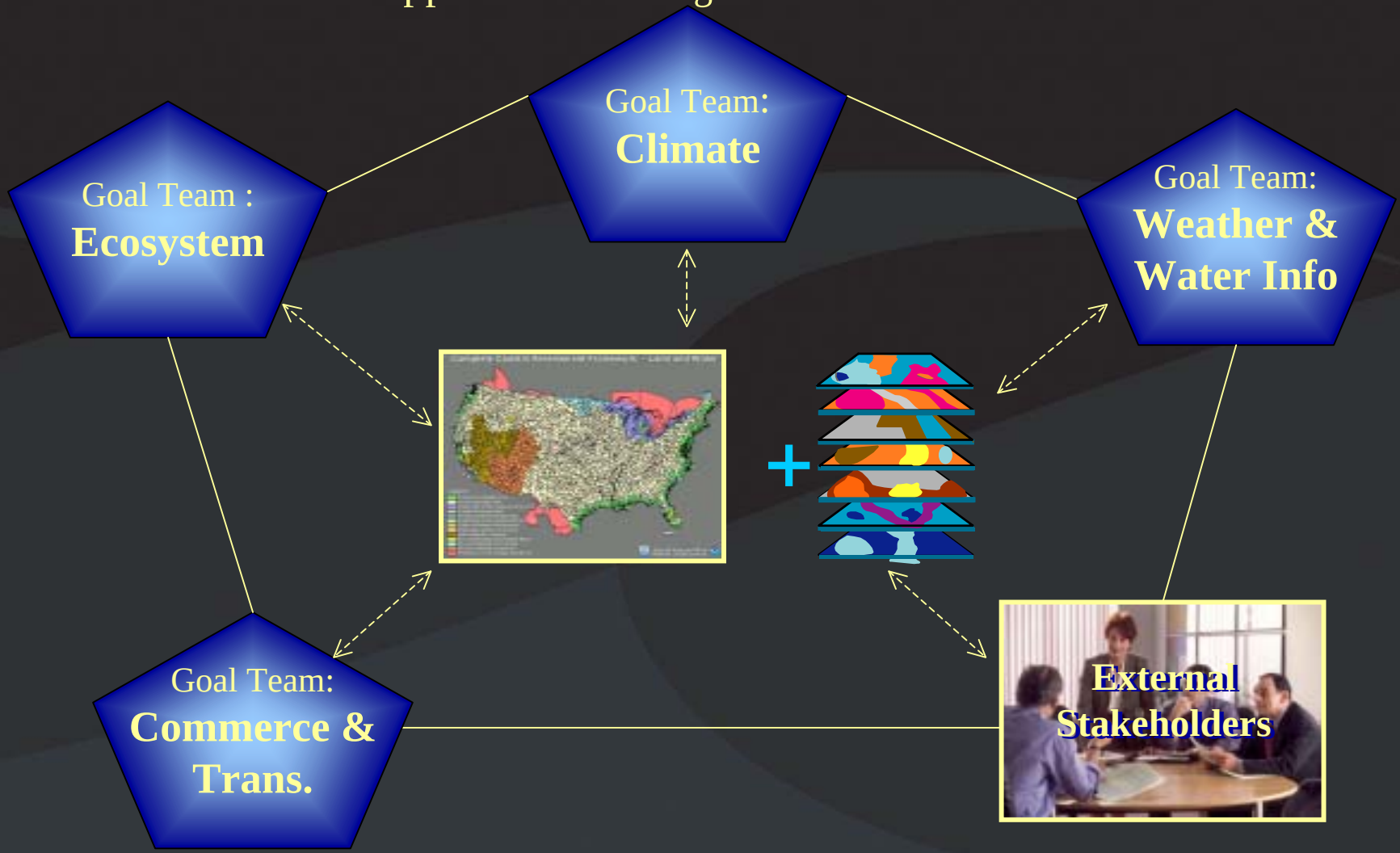
Combining a spatial framework with spatially consistent data adds up to a fundamental decision support tool for all goal teams and external stakeholders



An Integrated Spatial Framework for Ecosystem-Based Management

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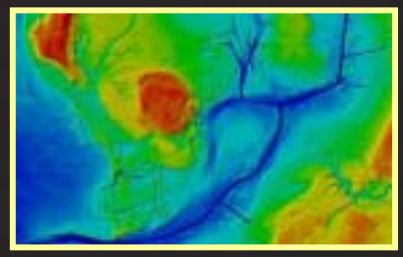
Many existing capabilities

- V-Datum
- Coastal Assessment & Data Synthesis (CADS) System
- Ocean Policy Information System (OPIS)
- Coastal change analysis program
- Spatial Trends in Coastal Socioeconomics



Final Thoughts

The final design of the spatial framework and the supporting data layers should be dictated by the types of ecosystem –based management questions that are to be addressed and the analyses that need to be conducted.

The more clearly defined the management issues and assessment requirements, the better the framework design will be and the more valuable it will be as a decision support tool.

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USGS

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Inland Boundaries from the State Perspective

Debra Hernandez
South Carolina

Background Slides

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FGDC/ICWI National Watershed Boundary Dataset (NWBS)

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USGS's Hydrologic Units

- In mid-1970s, USGS developed a standardized hydrologic unit system under the sponsorship of the Water Resources Council
- USGS hydrologic framework divides the U.S. into successively small hydrologic units
  - Regions, subregions, accounting units, and cataloging units

Level 1	22 Regions	Average 77,560 mi^2
Level 2	222 Sub-regions	Average 16,800 mi^2
Level 3	352 Basins (accounting units)	Average 10,596 mi^2
Level 4	2,149 Sub-basins (cataloguing units)	Average 703 mi^2

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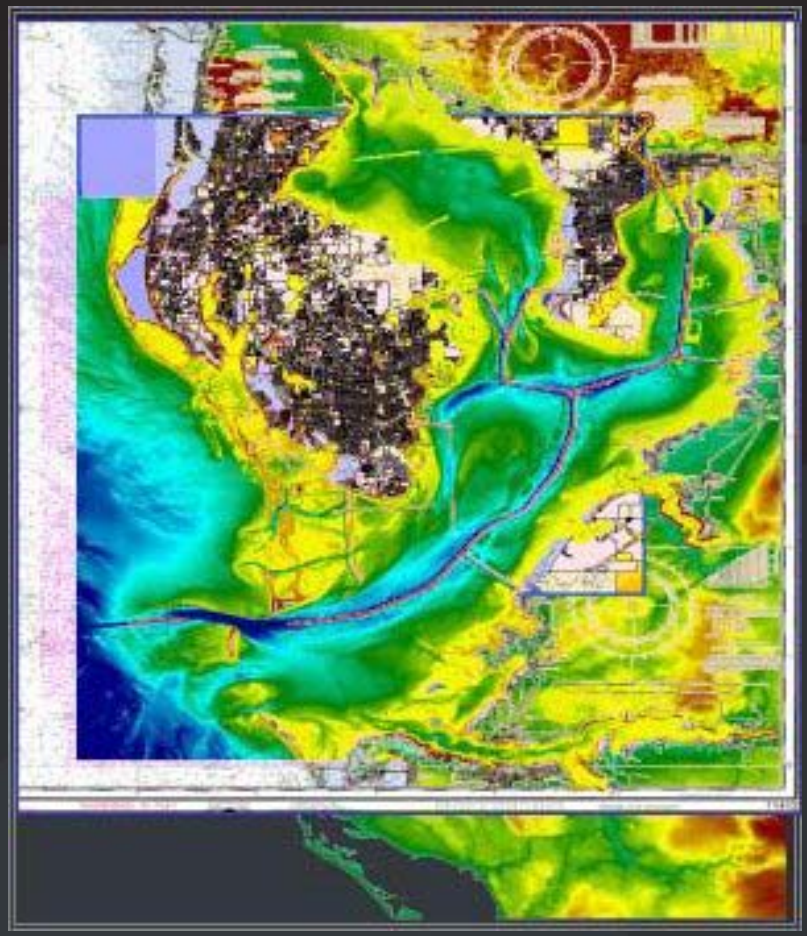
Refining the Watershed Framework

- Early 1980's, the Soil Conservation Service (now the NRCS) began mapping level 5 and 6 watersheds
- Standards were few and depended on local use

Level 5	22,000 Watersheds Regions	Average 250,000 acres
Level 6	160,000 Sub-watersheds	Average 40,000 acres

An Integrated Spatial Framework for Ecosystem-Based Management

A seamless, integrated spatial framework of geomorphologic, jurisdictional and biogeographic boundaries for both land and marine components.



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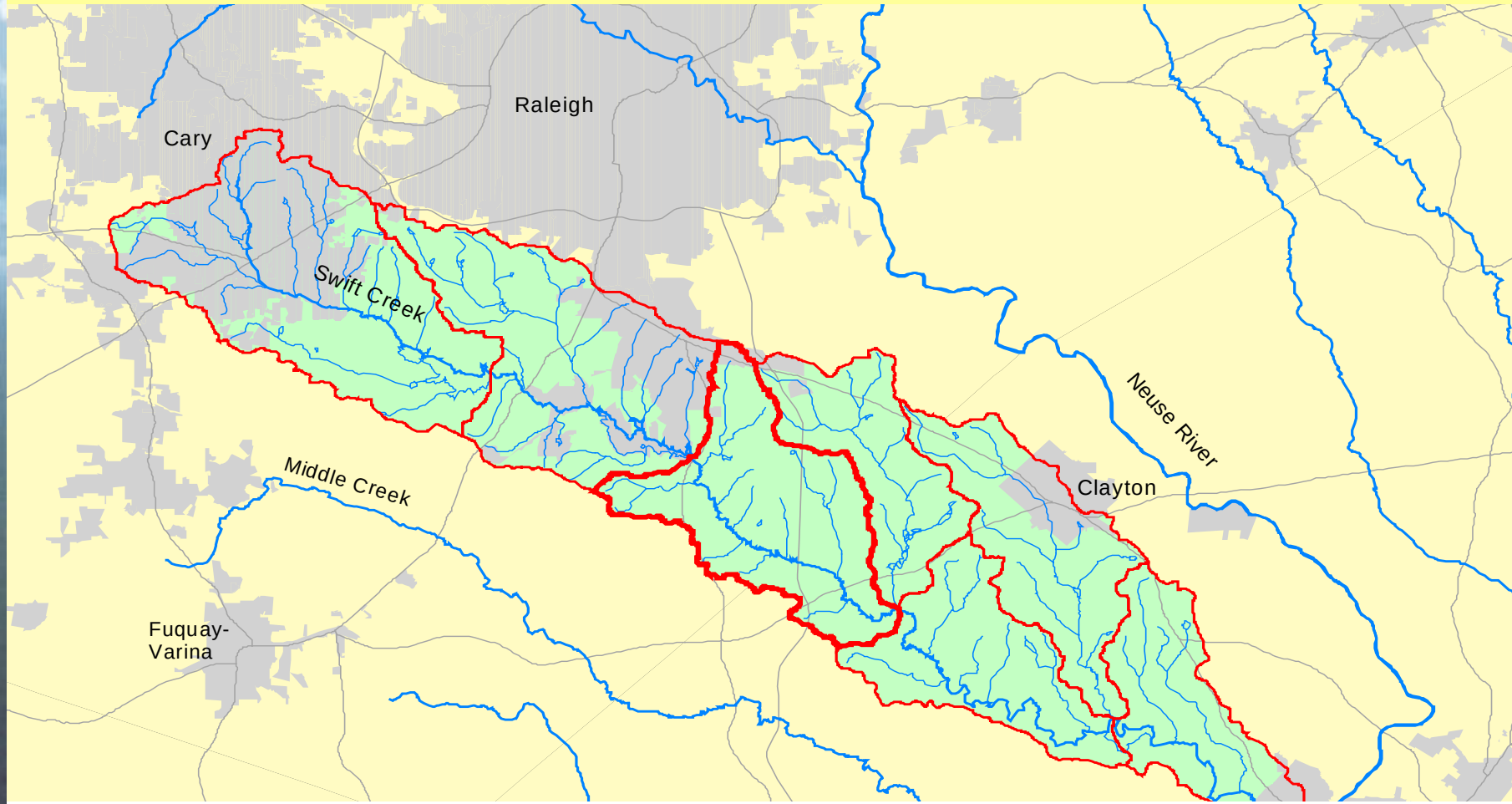
Example of Swift Creek, NC



RIDGE LINES

STREAMS

RED / BLUE INTERSECTIONS ARE DRAIN POINTS